

## **Bimonthly Contractor Report for NAS5-99094**

**Period Covered: April, 2002 though May, 2002**

### **General Discussion**

Contract NAS5-99094 was initiated on December 1, 1998. The first 1-year option, consisting of Tasks 1 - 5, was completed on November 30, 1999. A second 1-year option, consisting of Tasks 6 - 10, was initiated on December 1, 1999. The third 1-year option, consisting of Tasks 11 - 15, was completed on November 30, 2001. The fourth 1-year option, consisting of Tasks 16 - 20, was initiated on December 1, 2001. Tasks 16 - 20 cover specific activities in support of 3 major sensor programs, each with a separate NASA Principal Investigator (PI). Accordingly, the bimonthly narrative is organized such that each of the programs are discussed separately with individual task activities presented within each of the programs. Acronyms are used throughout the report to keep the writing succinct. An attached glossary contains definitions for these acronyms.

### **Airborne Oceanographic Lidar (AOL) (Global Carbon Cycle)**

#### **Task 16 - Mission Planning and Execution and Sensor Operation and Calibration**

##### **Field Activities:**

The 2002 Estuarine Habitat project continue from the last reporting period through April 15 in the present reporting period. Table 1 provides information on all of the missions flown as part of the joint project between the NOAA Coastal Services Center (CSC) and the NASA GSFC WFF AOL group. A total of 12 missions were flown in April. These included surveys conducted in the Chesapeake and Delaware Bays, the Middle Atlantic Shelf, and offshore of the Outer Banks of NC. The final mission flown on April 14 was a transit flight from WFF to the NOAA Aircraft Operations Center in Tampa.. The AOL instrument suite was off loaded and driven back to WFF in a rental truck.

The 2002 Estuarine Habitat project will be the final cooperative airborne campaign with the NOAA CSC in Charleston, SC. CSC is transitioning from the program into other coastal pursuits including collection and processing of airborne and satellite imagery for distribution to coastal managers. Instead, a collaborative program is being formed between the NOAA Marine Lab at Beaufort, NC and the NASA GSFC WFF AOL group. The initial flights in the new program will begin in March, 2003.

#### **Task 17- Data Processing Cataloguing and Archiving**

Raw data acquired with the AOL for ESTHAB '02 missions flown during April were archived on CDROMS. Also, Pump & Probe missions flown April were also archived on CDROMS. ESTHAB processed data for 2000 and 2001 were archived on CDROMS and were subsequently removed from the AOL networked disk drives.

### **Task 18 - Data Analysis Interpretation and Reporting and Laboratory Analytical Support**

Data from many of the ESTHAB 2002 were processed within 2 days of collection, and resulting plots placed on the website. Researchers from the State of New Jersey, and the University of Delaware used the online data for cruise planning. The data can be viewed on the Internet at:

[http://aol.wff.nasa.gov/html/graphics\\_library/aol\\_missions/missions\\_index.html](http://aol.wff.nasa.gov/html/graphics_library/aol_missions/missions_index.html)

Copies of the digital data were posted on the <http://osb.wff.nasa.gov> ftp site where collaborators from the NOAA Coastal Services Center, University of Delaware, and the State of NJ were able to retrieve it. Surface truthing data was received from the Department of Natural Resources of the State of NJ.

The shipboard laser system CCD detector array which was replaced with a compatible unit from Andover was received and installed on the SLF and tested for proper operation. The SLF was carried to Lewes DE and installed on the RV Cape Henlopen for several research cruises. The cruise on March 28 was overflow with the Twin Otter several times. Data is back at WFF and will be analysed.

The Micropac spectrometer was attached to a new Compaq IPAQ handheld computer and testing of data transfer methods was begun. The objective is to have an operational system during the April UAV test flights.

Additional analysis was conducted on the comparison between AOL laser-induced chlorophyll fluorescence and the MODIS fluorescence line height (FLH) product. The March 11, 2002 MODIS FLH image is shown in Figure 1. The ground tracks of the AOL sensors are shown within the figure. The banding that has been widely reported with MODIS products is obvious within the figure. Figure 2a shows the a profile of AOL laser-induced chlorophyll fluorescence and the MODIS FLH product extracted from the satellite image are plotted as a function of distance along track from the three flight lines in Figure 1. Good agreement can be seen between the two profiles and within the scatter diagram given on the panel to the right of the profiles. As shown within the scatter diagram, the comparison between the profiles yielded an  $R^2$  correlation coefficient of 0.81. Figure 2b CDOM rophyll fluorescence and the MODIS FLH product extracted from the satellite image are plotted as a function of distance along track from the three flight lines in Figure 1. The independence of the MODIS FLH product from CDOM can be readily seen in the profiles as well as in the scatter diagram where the  $R^2$  correlation coefficient is just 0.309.

**Table 1. Missions Flown During EstHab02**

<b>Date</b>	<b>Airport</b>	<b>Duration</b>	<b>Objective</b>	<b>Agency</b>	<b>Success</b>
03/01/02	Charleston, SC	2.7	Transit	NASA/NOAA	Yes
03/08/02	WFF	1.4	Instrument Checkout	NASA/NOAA	Yes
03/11/02	WFF	2.5	Gulf Stream	NASA	Yes
03/11/02	WFF	3.7	Delaware Bay	NOAA	Yes
03/19/02	WFF	3.3	NJ Coastal	NOAA	Yes
03/19/02	Atlantic City, NJ	3.1	Delaware Bay	NOAA	Yes
03/23/02	WFF	4.1	Shelf and Delaware Bay	NASA/NOAA	Yes
03/23/02	Cape May, NJ	2.2	Delaware Bay	NOAA	Yes
03/23/02	Cape May, NJ	3.7	Delaware Bay	NASA	Yes
03/28/02	WFF	3.0	NY Bight	NASA	Yes
03/28/02	Islip, NY	2.5	NY Bight	NASA	Yes
03/28/02	WFF	3.3	Shelf	NASA	Yes
03/29/02	WFF	2.8	Gulf Stream	NASA	Yes
04/04/02	WFF	4.2	NY Bight	NASA	Yes
04/05/02	WFF	3.5	NJ Coastal	NOAA	Yes
04/05/02	Atlantic City, NJ	2.2	Delaware Bay	NOAA	Yes
04/08/02	WFF	2.8	Shelf	NASA	Yes
04/09/02	WFF	1.2	Chesapeake Bay	NASA	Yes
04/09/02	BWI	1.2	Chesapeake Bay	NASA	Yes
04/09/02	WFF	1.1	Chesapeake Bay	NASA	Yes
04/09/02	BWI	0.9	Chesapeake Bay	NASA	Yes
04/11/02	WFF	3.2	NJ Coastal	NOAA	Yes
04/11/02	Atlantic City, NJ	4.1	Delaware Bay	NOAA	Yes
04/12/02	WFF	3.1	Shelf	NASA	Yes
04/14/02	WFF	7.5	Shelf	NASA	Yes



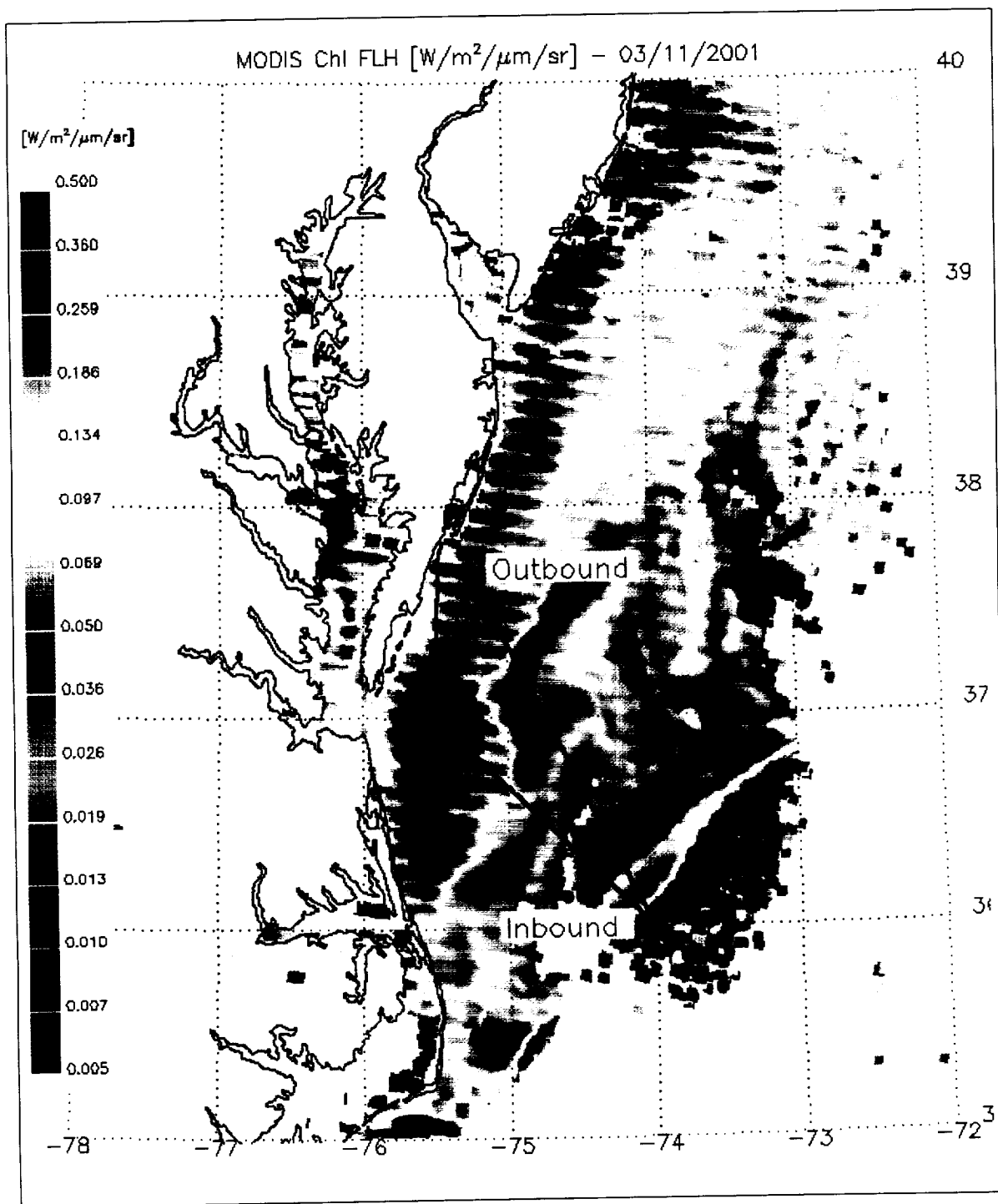


Figure 1. MODIS Fluorescence Line Height image with AOL ground tracks.



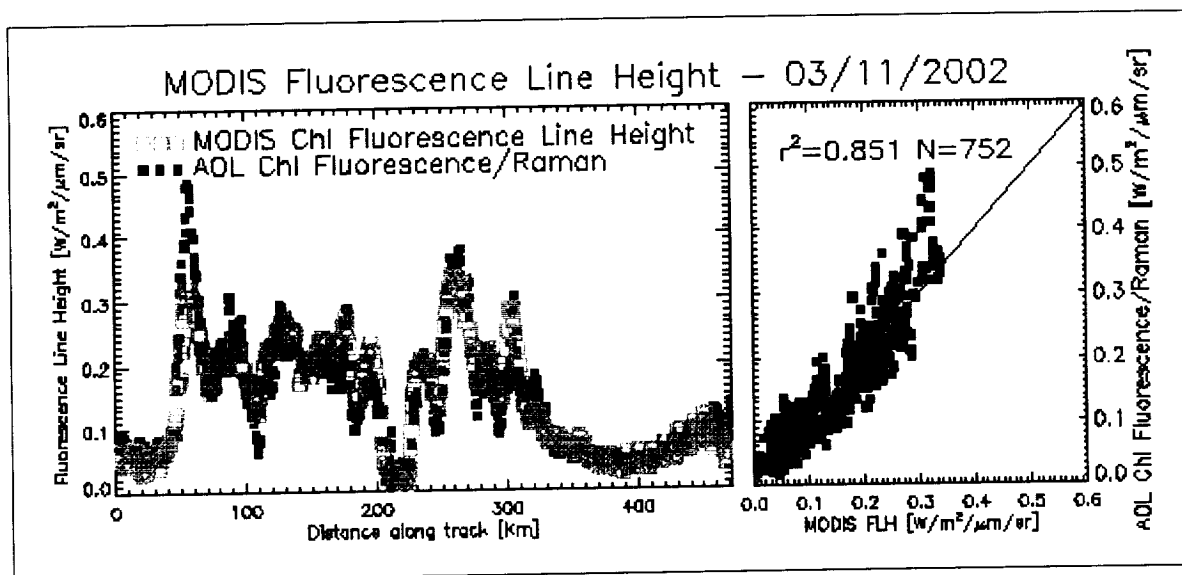


Figure 2a. (left panel) Plot of AOL laser-induced chlorophyll fluorescence and corresponding MODIS Fluorescence Line Height. (right panel) Scatter diagram of AOL laser-induced chlorophyll fluorescence and corresponding MODIS Fluorescence Line Height.

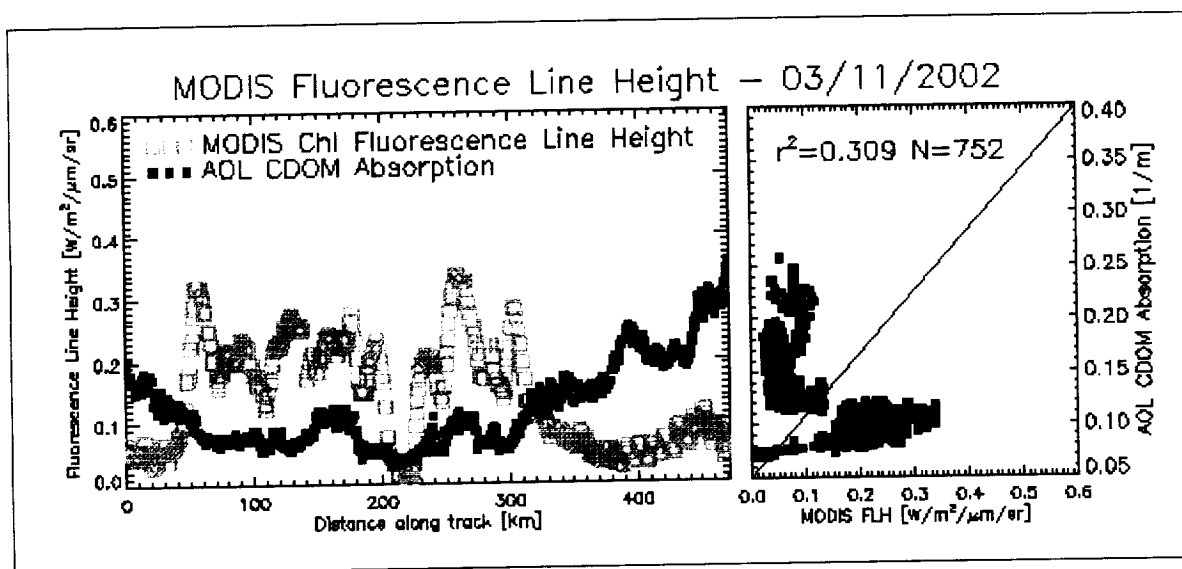


Figure 2b. (left panel) Plot of AOL laser-induced CDOM fluorescence and corresponding MODIS Fluorescence Line Height. (right panel) Scatter diagram of AOL laser-induced CDOM fluorescence and corresponding MODIS Fluorescence Line Height.





### **SeaWiFS data analysis:**

The SeaWiFS global archive is being kept up to date. A new computer has been set up to allow for parallel processing of the reprocessed SeaWiFS data set once that complete data set has been delivered. Once the reprocessed SeaWiFS data has been converted to imagery, the old version of the data set will be compared to the newly reprocessed data set to fully quantify the effect that the processing changes has had on the IOP outputs. Therefore the need to maintain both versions of the data required additional CPU capability and additional storage space. The new computer system is now configured and waiting for the data delivery.

SeaWiFS imagery in the Central American Pacific coast region has been studied in detail and final touches are now being applied to a paper describing the intense periodic upwelling seen in this region. Previous studies have focused on this phenomenon, but use SST data to monitor the upwelling along the coast. The temperature gradient is very small with depth in this region, so that the upwelled water is very quickly warmed to the nominal surface temperature. By looking at our CDOM absorption coefficient, we can see much more detail in the whole process because the upwelled CDOM is highly absorbing and it takes much longer to photodegrade the upwelled CDOM so that its absorption levels match the nominal surface levels.

### **Software development:**

Software tools were also added to the suite mentioned above that add the same benefits of SeaWiFS data analysis that were gained in the MODIS data analysis mentioned above.

New tools were also created to automatically process SeaWiFS images into small movies that can be viewed on a hand held computer. This computer is to be used to show features of interest to fellow researchers when carting a laptop around is not feasible, e.g., during coffee breaks at science team meetings.

More software archiving tools have been created which allow automatic "mirroring" of data between computers. This will help to maintain separate versions of the global SeaWiFS data set and also in backups of important data sets.

tools built as described in the last bimonthly report and was delivered in a timely manner.

### **Task 19 - Network Development and Maintenance**

See the Task 14 discussion for the ATM sensor (below). Many tasks described in that section apply to the AOL sensor support in this section.

### **Task 20 - Instrument Maintenance Engineering and Fabrication**

During the previous reporting period the AOL3 system was modified to allow a beam-splitter to be installed and the new Andover detector attached to allow testing of the Andover detector during

the upcoming ESTHAB missions. This activity included conversion of the instrument back and forth between standard and CCD configuration. This activity also included the mounting of secondary power supply for pump and probe missions. The Andover detector was tested in this configuration as part of a flight conducted on April 12. The realtime engineering report indicated that the detector functioned well and would provide approximately the same signal-to-noise ratio currently obtained from the AOL fluorosensor. Analysis of this data set will be performed and reported on during the next reporting period.

A number of lens holders and other optical and electronic fasteners were fabricated in support of the development of a laboratory/ship instrument for performing discrimination of phytoplankton taxonomic groups using laser-induced fluorescence.

### **Airborne Topographic Mapper (ATM)**

#### **Task 16 - Mission Planning and Execution and Sensor Operation and Calibration**

Mission planning for the 2002 Arctic Ice Mapping campaign was finalized during late May. A total of 12 missions were planned. These included data-collection/transit missions between Thule, Greenland and Longyearbyen, Norway and from Thule, Greenland and Kangerlussuaq, Greenland.

The ATM was loaded on the aircraft during the third week of April. Also installed were the CARDS and Snow Accumulation Rate ice-penetrating radars from the University of Kansas and the CRYOSAT simulation radar altimeter from Johns Hopkins Applied Physics Laboratory. A test flight of the instrumentation was successfully completed in early May. The test flight included passes flown over the calibration ramp east of Building N-159 at WFF and a full island survey of Assateague Island.

The 2002 Arctic Ice Mapping field deployment commenced on April 13 with a transit flight from WFF to Thule Air Force Base, Greenland. Attempts at the transit mission from Thule, Greenland to Longyearbyen, Norway on May 15 and 17. Both of these missions had to be aborted approximately 20 minutes into the mission because of an indication of an engine fire. Following the May 17 flight, the problem was fixed and the data-collection/transit mission was successfully completed May 18.

A list of the missions completed during the 2002 Arctic Ice Mapping field deployment is provided in Table 2. A series of adverse weather over southern Greenland in early June prevented the successful completion of a mission designed to map glaciers located near the southern tip of the island. This mission will be flown as part of the 2003 Arctic Ice Mapping field deployment.

**Table 2. List of Missions Flown during the 2002 Arctic Ice Mapping Field Deployment**

<b>Date</b>	<b>Staging Site</b>	<b>Purpose</b>
May 13	Wallops Flight Facility	Transit to Thule, Greenland
May 15	Thule, Greenland	Data Collection/Transit to Longyearbyen, Norway (aborted)
May 17	Thule, Greenland	Data Collection/Transit to Longyearbyen, Norway (aborted)
May 18	Thule, Greenland	Data Collection/Transit to Longyearbyen, Norway (successful)
May 20	Longyearbyen, Norway	Sea Ice Mission
May 22	Longyearbyen, Norway	Glacier Mapping
May 23	Longyearbyen, Norway	Sea Ice Mission
May 24	Longyearbyen, Norway	Data Collection/Transit to Thule, Greenland
May 28	Thule, Greenland	Petermann Glacier
May 29	Thule, Greenland	West Coast Glaciers
May 30	Thule, Greenland	ICESat
May 31	Thule, Greenland	Transit to Kangerlussuaq
May 31	Kangerlussuaq, Greenland	Jakobshavn Glacier
June 1	Kangerlussuaq, Greenland	Ice Sheet Survey
June 4	Kangerlussuaq, Greenland	E. Coast Glaciers
June 7	Kangerlussuaq, Greenland	Transit to WFF

## **Task 17 - Data Processing Cataloguing and Archiving**

Global Carbon Cycle (C0) - Continued Level 0<sup>1</sup> archiving procedure for ESTHAB '02 missions flown 4/5-14/02. Level 1<sup>2</sup> processing was also completed and the data provided to collaborators through the Observational Science Branch public ftp site: [osb.wff.nasa.gov/esthab02](http://osb.wff.nasa.gov/esthab02) Also, Pump & Probe mission flown 4/12/02.

Topographic Mapping, Ice (TA) - Commenced Level 0 archiving procedure for Arctic Ice Mapping '02 missions with local checkout flights flown 5/3/02 and 5/6/02. Participated in prep work for Greenland/Svalbard deployment. Distributed Level 2 processed data from A.I.M.'01 missions 5/20,21,27/01. Distributed Level 2<sup>3</sup> processed data from A.I.M.'97 missions 5/13/97 and 5/15/97.

Topographic Mapping, Land (TA) - Distributed Level 1 processed file from Nevada mission 6/19/01.

Topographic Mapping, Beach (TB) - No archiving or processing activity for this period.

Topographic Mapping, Antarctic (T0) - Distributed preliminary ancillary files of Level 2 processing of Antarctic missions. These include: 12/19(PM), 12/22(PM), 12/23(AM,PM), 12/24, 12/26, 12/27(AM), 12/29(AM), 12/30, and 12/31/01. Distrusted copy of CAMBOT photos from 12/30/01 (Mt. Erebus only).

Topographic Mapping, ICESat (GL) - No archiving or processing activity for this period. See above (T0) report on distribution of Level 2 ancillary files from 12/19(PM) flight.

Scanning Radar Altimeter (R0) - No archiving or processing activity for this period. Performed requested forwards and mailings of papers and correspondence.

## **Task 18 - Data Analysis Interpretation and Reporting and Laboratory Analytical Support**

Numerous requests were received for existing figures showing ATM ice mapping results. A figure was provided from the 2000 Science paper to French scientific monthly La Recherche. A map of ATM-derived Greenland elevation change was provided for a brochure being compiled

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<sup>1</sup>Level 1 is the basic processing through program *newvalT* which converts raw data to a file ready to combine with GPS trajectory data.

<sup>2</sup>Level 2 combines the Level 1 data with a GPS trajectory through program *qfit* to produce a file consisting of laser spot elevations.

<sup>3</sup>Level 0 consists of copying the raw data to CDROMS and entering the field notes and file names into computer retrievable information files.

by the NASA ICESat project. Several figures were provided for Waleed Abdalati, NASA HQ polar programs manager, for his presentation about cryospheric applications of airborne laser altimetry at the spring American Geophysical Union conference.

A figure was prepared for paper by Eric Rignot/JPL and Robert Thomas/EGG for the journal Science reviewing what is known about ice-sheet mass balance. The figure showed a map of Greenland with ice surface elevation change rates derived from three sources: NASA ATM airborne surveys 1993-1999; NASA surface traverse 1994-97; and data from Niels Reeh estimating changes relative to the British North Greenland Expedition in 1953.

More graphics were made from the ATM surveys in Antarctica. A few more figures were made for Jim Garvin, head of Mars exploration at NASA headquarters. He was interested in seeing ponds and gullies which resemble sites on Mars that may harbor life, as well as the crater of the Mt. Erebus volcano. Also, to show the level of detail that could be seen in the data, DEMs (digital elevation models) were made of the Lake Bonney camp and environs. Individual buildings were just barely discernible.

The ATM's were installed on the NASA P-3 aircraft for an ice mapping mission to Svalbard and Greenland. Test flights were flown at Wallops on May 3 and 6. The ramp passes were processed and checked. The aircraft departed May 13 and was conducting mapping flights through the end of the month.

Several types of analyses of the ATM Mojave data were made: (1) crossover comparisons in which ATM elevations were compared at pass crossings, with the estimation of a height difference and pitch and roll errors for each pass; (2) alongtrack differences between ATM3 and ATM2 elevations, with the estimation of a height difference, pitch errors for each instrument, and a roll difference error; and (3) elevation differences for ATM2 and ATM3 with a truck survey for two passes over Silver Lake on 19 May 2001. The Silver Lake passes contain segments of ~30 seconds for which the surface is very smooth and flat, which should allow very accurate smooth elevations to be estimated. The most troubling aspect of the results was the 6 cm change in the ATM3-ATM2 differences from one pass to the next. After a rather exhaustive search for possible explanations for this change, only a real instrument change could be found as an explanation. Average differences between ATM3 and truck elevations were - 4 cm for the first pass and +2 cm for the second pass. The rms for the differences were on the order of 3 cm for the 15 truck crossings of the ATM groundtrack. For ATM2, the differences were +4 cm for each pass (with significant uncertainty in the value of alpha used, since no good ground calibrations for ATM2 were available). It is anticipated that some validation of the variability of the ATM range measurements can be made in the near future.

Crossovers analyses of the Antarctic data showed a much larger number of crossovers than was available from the Mojave data. However, most of these crossovers involved at least one major aircraft turn, thus rendering the results less useful for the validation of mounting biases. A number of height differences in the range 20-25 cm were observed and have yet to be explained

(larger differences of 50 cm or more were also found, but these occurred only at low elevations and are believed to be observation of real elevation changes). Some of these involved significantly different aircraft altitudes, with the possibility that range walk corrections for the higher elevation pass may be responsible. In addition, measurements were often being made to surfaces with slopes of 30 deg or more. This means that some measurements strike the surface with off-nadir angles over 50 deg and the effects of a finite footprint size are possibly significant.

Scan parameter estimates were made for ramp passes made in preparation for the Arctic campaign. This included both ATM2, operating normally, and ATM3 which was installed with counter-clockwise scan rotation. To handle the counter-clockwise rotation, a slight modification to the *cres* program was necessary.

### **Task 19 - Network Development and Maintenance**

Prepared and participated in the Arctic 2002 Ice Mapping project.

Started work with the Litton LN100G. Requested more manuals.

Identified a filing cabinet for storing DLT tapes and DVD/CDROMs.

Developed a system for cataloging our DVD library. Information is automatically extracted from the DVDs to create the catalog and records the volume set, size of the volume, and each of the files and directories on all the media. Auxiliary files from the volume set, such as the ident file, are also cataloged.

Improved programs to verify CD/DVDs to output more succinct information. Improved programs to generate labels to work with DVDs.

### **Task 20 - Instrument Maintenance Engineering and Fabrication**

#### **April 2002**

Preparation of the prototype data system for the Greenland 2002 mission continued. The overall design was changed to accommodate some issues with the provided drivers; individual code modules were combined and threaded; rack-mount components were acquired and installed on the P-3; and initial testing and data collection commenced.

Because of an incompatibility between RT Linux and the provided digitizer driver, the design changed to include a direct measurement of hardware-interrupt latency by using a timing board. A second timing board was purchased to accommodate this and provide a second hardware interrupt. Interrupt latency would be measured on all GPS, laser, and scanner events and used to correct CPU time-stamps, the base clock of the application.

After experimenting with the timing board driver and multiple interrupts, it was found that only one hardware interrupt could be used due to a another driver issue. GPS and scanner events changed from interrupt-driven events to polled-events, where a polling thread monitors the status of an external circuit to identify an occurrence. The thread then stops the latency timer and corrects the CPU time-stamp generated appropriately.

Another problem surfaced with the recently purchased 2GHz PC hardware: an incompatibility with the motherboard, driver and/or kernel caused the digitizer to operate incorrectly. This problem was most likely due to SMP (Symmetric Multi Processing) issues, but was not specifically identified. The hardware was then reverted back to a 1.3GHz AMD system.

In changing from RT Linux OS, several OS's were attempted - including RH 7.1, RH 7.2, Mandrake 8.1, and Mandrake 8.0. Mandrake 8.0 worked properly with the AMD system and remained on the data system at least until the end of the Greenland 2002 mission. When measuring the interrupt latency of each event, a simple external circuit was used in the following manner:

- 1) An event pulse triggers FF (Flip Flop), which starts counter on timing board.
- 2) Interrupt is serviced some usec later, which immediately sends signal on DO (Digital Out) and stops counter via external circuit.
- 3) Interrupt reads the halted counter.
- 4) Flip flop is reset by emitting clock pulses from timing board in interrupt routine.
- 5) Counter is reset and FF is ready for next event.

In the case of a polling event, a thread monitors a DI (Digital In) and detects a change to signal an event. It then operates as above, except that the code executing is not an interrupt. The counters were implemented in a "cascading mode", which essentially provided a method of timing that would not be limited to 16-bits of counts (65536 counts).

Next, appropriate 100-conductor cables were constructed to connect the timing boards to the external circuit. ATM3 was then connected in the lab to the prototype system. The hall-effect sensor on the rotating mirror produced a signal that generated multiple interrupts per event, so the timing board in ATM3 was modified to provide a clean pulse externally. After testing all of the code fragments, they were combined into a single multi-threaded application. Pipes were created for monitoring the status of the system via console.

## **May 2002**

The prototype system was installed onto the P-3, splitting the PMT signal from ATM3. Ground tests were conducted for the first time and a test mission over Assateague Island was conducted. A waveform display consisting of QT widgets was created for monitoring the system during flight. Additional digitizer controls were added to make adjustments mid-flight in order to accommodate various signal strengths. An up-looking spectrometer was connected to the

prototype system, and additional code was written to collect GPS-tagged spectra for passive data normalization. An alternate ground test version of the data system was made in the field to capture full waveforms instead of the default segmented mode captures. This was necessary because of the recovery time of the digitizer between acquisitions prevented short ranges from appearing. After installation and tests on the P-3, the prototype data system was operated for the duration of the Greenland 2002 mission.

A compact spectrometer and data system was designed and built to be flown on the BAI TERN UAV. This package consisted of the Micro-pac Air-borne Data and Spectrometer System which required numerous changes due to differences in the sampling operation and operational prototype. Rob Russell and Carl Schirtzinger worked with the UAV test team and made further changes to the system.

Several new computers and equipment were mounted on the aircraft requiring many new mounts, brackets, etc. Three 3 flat screen monitors were modified and remounted to gain rack space.

## **Other Mission Support Activities**

### **Task 16 - Mission Planning and Execution and Sensor Operation and Calibration**

Ozonesonde launches were conducted weekly throughout the reporting period.

### **Task 17 - Data Processing Cataloguing and Archiving**

No archiving or processing activity for this period.

### **Task 18 - Data Analysis Interpretation and Reporting and Laboratory Analytical Support**

#### **EAARL Activities:**

No activities during the reporting period.

#### **Modeling Activities:**

In April and May the major programs needed to create the data set for the ocean modeling program were written and tested. They consist of four main programs: a Perl program that downloads data from the USGS website and stores it in binary format, a Perl program that extracts and validates selected water quality and streamflow information from the binary data, a Fortran program that uses the extracted data to determine an equation that expresses water quality load as a function of streamflow, and also calculates the streamflow to load correlations, and a Fortran program that graphs a correlation histogram for each selected water quality parameter. Note that in the February/Mar bimonthly report, the second program had been planned to be written in C++. That was changed to Perl.



These programs were also tested with several trial runs using subsets of the list of selected sites. As of the end of May, a trial run of 82 sites was successfully completed.

The programs require selected site information as input. To interface between the ArcView projects, which are on a PC, and the programs which reside on an IRIX system, a spreadsheet of selected site information was created on the PC documenting selection criteria and other information for the approximately 500 selected sites. The spreadsheet was converted to tab separated data and transferred via ftp to the IRIX system. Then this was used as input in the programs.

In addition, several smaller projects that support Dr. Moisan's work were completed: the ArcView projects were transferred from an older PC to a newly purchased PC, a scanner was installed and used to scan signature pages of Dr. Moisan's proposals, a year end summary of the coastal data set project was written for Dr. Moisan, and PowerPoint slides displaying some of the ArcView data were created for Dr. Moisan to use in a proposal.

#### **Task 19 - Network Development and Maintenance**

No activity during reporting period.

#### **Task 20 - Instrument Maintenance Engineering and Fabrication**

##### **EAARL Activities:**

No activities during the reporting period.

##### **Scanning Radar Altimeter (SRA)**

In order to make more room for the Scripps Institute equipment in the SRA rack it was decided to shift more of the SRA components to the starboard side of the rack. The LCD color monitor was shifted from the top left, to the top right, using the space normally reserved for the NOAA TV displays and switching. The two Sorensen power supplies were relocated lower in the rack to a position just above the CPU chassis on the port side of rack. This opened up a full 25" in the top left hand rack, where there had previously been only 12". A shelf bracket was also added above the GPS receivers on the starboard side of the rack to provide stowage space for Ed Walsh's laptop.

The annotated photos of the SRA electronics are not now up to date. A sketch of the new rack layout was developed and sent to Ed Walsh (NASA) and Terry Lynch (NOAA). Ed Walsh would like a new set of photos, but we presently don't have the download capability for our digital camera.

During preparation for Ed Walsh's visit to WFF it was discovered that the network card in the SRA computer wasn't missing and that the A/D converter wasn't working properly. The A/D converter was modified by changing the bias of the +/-5v. connections, rather than single ended +5v./Ground. The A/D converter is now functioning properly.

New containers for shipping the SRA were fabricated. The old shipping containers were in poor condition.

### **Meteorological Laboratory Support**

The development of the ECC pump efficiency hardware was completed and a team of personnel from the meteorological group is currently working on the data requirements for the instrument.

Preparations were initiated for two field missions. The first in Norway required that preparation of Humidity Sondes and three data systems for shipment. Installation and tests of a new version of software for the W9000 data system were completed. All systems were verified by calibration and receiving data from 3 radiosonde balloons launched at WFF. The second mission will be conducted later this summer from the Chesapeake Light platform located in the Atlantic Ocean offshore of Virginia Beach, VA. The preparation of instruments, data system, hardware and supplies for this mission was initiated during the reporting period.

### **Tropical Rain Measuring Mission (TRMM)**

Carl Schirtzinger supported the TRMM project by building rack panels and mounts for instrumentation. This included several changes and up-grades made to the TRMM instrumentation needed for this year's deployment.